

Chapter 1. General Introduction

INTRODUCTION

The South Bay Ocean Outfall discharges treated effluent to the Pacific Ocean that originates from two separate sources, including the International Wastewater Treatment Plant (IWTP) operated by the International Boundary and Water Commission (IBWC), and the City of San Diego's South Bay Water Reclamation Plant (SBWRP). Wastewater discharge from the IWTP began on January 13, 1999 and is performed under the terms and conditions set forth in Order No. 96–50, Cease and Desist Order No. 96–52 for NPDES Permit No. CA0108928. Discharge from the SBWRP began on May 6, 2002 and is performed according to the provisions set forth in Order No. R9-2006-0067 for NPDES Permit No. CA0109045. The Monitoring and Reporting Program (MRP) included in each of the above permits and orders defines the requirements for monitoring receiving waters in the South Bay coastal region, including sampling designs, compliance criteria, types of laboratory analyses, and data analysis and reporting guidelines.

All receiving waters monitoring for the South Bay outfall region with respect to the above MRPs has been performed by the City of San Diego since wastewater discharge began in 1999. The City also conducted 3½ years of pre-discharge monitoring in order to characterize background environmental conditions for the region (City of San Diego 2000a). The results of this baseline study provide background information against which post-discharge data and conditions may be compared. In addition, the City has conducted annual region-wide surveys off the coast of San Diego since 1994 either as part of regular South Bay monitoring requirements (e.g., City of San Diego 1998, 1999, 2000b, 2001–2003, 2006–2008) or as part of larger, multi-agency surveys of the entire Southern California Bight (e.g., Bergen et al. 1998, 2001, Noblet et al. 2002, Ranasinghe et al. 2003, 2007, Schiff et al. 2006). Such large-scale surveys are useful in characterizing the ecological health of

diverse coastal areas and may help to identify and distinguish reference sites from those impacted by wastewater or stormwater discharges, urban runoff, or other sources of contamination.

Finally, the City of San Diego and the IBWC also contract with Ocean Imaging of Solana Beach, California to conduct a remote sensing program for the San Diego/Tijuana region as part of the ocean monitoring programs for the Point Loma and South Bay areas. Imagery from satellite data and aerial sensors produce a synoptic picture of surface water clarity that is not possible using shipboard sampling alone. However, a major limitation of aerial and satellite images is that they only provide information about surface or near-surface waters (~0–15 m) without providing any direct data regarding the movement, color, or clarity of deeper waters. In spite of these limitations, one objective of this ongoing project is to ascertain relationships between the various types of imagery and data collected in the field. With public health issues being a paramount concern of ocean monitoring programs, any information that helps to provide a clearer and more complete picture of water conditions is beneficial to the general public as well as to program managers and researchers. Having access to a large-scale overview of surface waters within a few hours of image collection also has the potential to bring the monitoring program closer to real-time diagnoses of possible contamination, and adds predictability to the impact that natural events such as storms and heavy rains may have on shoreline water quality. Results from the San Diego/Tijuana remote sensing program for calendar year 2008 are summarized in Svejksky (2009).

This report presents the results of all receiving waters monitoring conducted as part of the South Bay monitoring program in 2008. Included are results from all regular fixed monitoring stations that comprise a grid surrounding the South Bay outfall. No

sampling was conducted at randomly selected benthic sites in 2008 due to a resource exchange agreement to allow participation in the Bight'08 regional monitoring program (see above). The results of the remote sensing surveys conducted during the year as reported by Svejksky (2009) are also considered and integrated into interpretations of oceanographic and water quality data (e.g., fecal indicator bacteria, total suspended solids, oil and grease). Comparisons are also made herein to conditions present during previous years in order to evaluate changes that may be related to wastewater discharge and transport or to other anthropogenic or natural events. The major components of the monitoring program are covered in the following six chapters: Oceanographic Conditions, Microbiology, Sediment Characteristics, Macrobenthic Communities, Demersal Fishes and Megabenthic Invertebrates, and Bioaccumulation of Contaminants in Fish Tissues. Some general background information and procedures for the regular fixed-grid monitoring program are given below and in subsequent chapters and appendices.

REGULAR FIXED-GRID MONITORING

The South Bay Ocean Outfall is located just north of the border between the United States and Mexico. The outfall terminates approximately 5.6 km offshore at a depth of about 27 m. Unlike other southern California ocean outfalls that are located on the surface of the seabed, the pipeline first begins as a tunnel on land and then continues under the seabed to a distance about 4.3 km offshore. From there it connects to a vertical riser assembly that conveys effluent to a pipeline buried just beneath the surface of the seabed. This subsurface pipeline then splits into a Y-shaped multiport diffuser system, with the two diffuser legs extending an additional 0.6 km to the north and south. The outfall was originally designed to discharge effluent via a total of 165 diffuser ports and risers, which included one riser located at the center of the wye and 82 others spaced along each diffuser leg. However, consistent low flows have required closure of all ports along the northern diffuser leg and many along the southern diffuser as well since discharge began in order to

maintain sufficient back pressure within the drop shaft so that the outfall can operate in accordance with the theoretical model. Consequently, wastewater discharge has been generally limited to the distal end of the southern diffuser leg, with the exception of a few intermediate points at or near the center of the diffuser legs.

The regular sampling area for the South Bay outfall region extends from the tip of Point Loma southward to Playa Blanca, northern Baja California (Mexico), and from the shoreline seaward to a depth of about 61 m. The offshore monitoring stations are arranged in a grid that spans the terminus of the outfall, with each site being monitored in accordance with NPDES permit requirements. Sampling at these fixed stations includes monthly seawater measurements of physical, chemical, and bacteriological parameters in order to document water quality conditions in the area. Benthic sediment samples are collected semiannually to monitor macrofaunal communities and sediment conditions. Trawl surveys are performed quarterly to monitor communities of demersal fish and large, bottom-dwelling invertebrates (megabenthos). Additionally, analyses of fish tissues are performed semiannually to assess the bioaccumulation of chemical constituents that may have ecological or human health implications.

LITERATURE CITED

- Bergen, M., S.B. Weisberg, D. Cadien, A. Dalkey, D. Montagne, R.W. Smith, J.K. Stull, and R.G. Velarde. (1998). Southern California Bight 1994 Pilot Project: IV. Benthic Infauna. Southern California Coastal Water Research Project, Westminster, CA.
- Bergen, M., S.B. Weisberg, R.W. Smith, D.B. Cadien, A. Dalkey, D.E. Montagne, J.K. Stull, R.G. Velarde, and J.A. Ranasinghe. (2001). Relationship between depth, sediment, latitude, and the structure of benthic infaunal assemblages on the mainland shelf of southern California. *Marine Biology*, 138: 637–647.

- City of San Diego. (1998). San Diego Regional Monitoring Report for 1994–1996. City of San Diego Ocean Monitoring Program, Metropolitan Wastewater Department, Environmental Monitoring and Technical Services Division, San Diego, CA.
- City of San Diego. (1999). San Diego Regional Monitoring Report for 1994–1997. City of San Diego Ocean Monitoring Program, Metropolitan Wastewater Department, Environmental Monitoring and Technical Services Division, San Diego, CA.
- City of San Diego. (2000a). International Wastewater Treatment Plant Final Baseline Ocean Monitoring Report for the South Bay Ocean Outfall (1995–1998). City of San Diego Ocean Monitoring Program, Metropolitan Wastewater Department, Environmental Monitoring and Technical Services Division, San Diego, CA.
- City of San Diego. (2000b). Annual Receiving Waters Monitoring Report for the South Bay Ocean Outfall (1999). City of San Diego Ocean Monitoring Program, Metropolitan Wastewater Department, Environmental Monitoring and Technical Services Division, San Diego, CA.
- City of San Diego. (2001). Annual Receiving Waters Monitoring Report for the South Bay Ocean Outfall (2000). City of San Diego Ocean Monitoring Program, Metropolitan Wastewater Department, Environmental Monitoring and Technical Services Division, San Diego, CA.
- City of San Diego. (2002). Annual Receiving Waters Monitoring Report for the South Bay Ocean Outfall (2001). City of San Diego Ocean Monitoring Program, Metropolitan Wastewater Department, Environmental Monitoring and Technical Services Division, San Diego, CA.
- City of San Diego. (2003). Annual Receiving Waters Monitoring Report for the South Bay Ocean Outfall (2002). City of San Diego Ocean Monitoring Program, Metropolitan Wastewater Department, Environmental Monitoring and Technical Services Division, San Diego, CA.
- City of San Diego. (2006). Annual Receiving Waters Monitoring Report for the South Bay Ocean Outfall (International Wastewater Treatment Plant), 2005. City of San Diego Ocean Monitoring Program, Metropolitan Wastewater Department, Environmental Monitoring and Technical Services Division, San Diego, CA.
- City of San Diego. (2007). Annual Receiving Waters Monitoring Report for the South Bay Ocean Outfall (International Wastewater Treatment Plant), 2006. City of San Diego Ocean Monitoring Program, Metropolitan Wastewater Department, Environmental Monitoring and Technical Services Division, San Diego, CA.
- City of San Diego. (2008). Annual Receiving Waters Monitoring Report for the South Bay Ocean Outfall (International Wastewater Treatment Plant), 2007. City of San Diego Ocean Monitoring Program, Metropolitan Wastewater Department, Environmental Monitoring and Technical Services Division, San Diego, CA.
- Noblet, J.A., E.Y. Zeng, R. Baird, R.W. Gossett, R.J. Ozretich, and C.R. Phillips. (2002). Southern California Bight 1998 Regional Monitoring Program: VI. Sediment Chemistry. Southern California Coastal Water Research Project, Westminster, CA.
- Ranasinghe, J.A., D.E. Montagne, R.W. Smith, T. K. Mikel, S.B. Weisberg, D. Cadien, R. Velarde, and A. Dalkey. (2003). Southern California Bight 1998 Regional Monitoring Program: VII. Benthic Macrofauna. Southern California Coastal Water Research Project. Westminster, CA.
- Ranasinghe, J.A., A.M. Barnett, K. Schiff, D.E. Montagne, C. Brantley, C. Beegan, D.B. Cadien, C. Cash, G.B. Deets, D.R. Diener, T.K. Mikel, R.W. Smith, R.G. Velarde, S.D. Watts, and S.B. Weisberg. (2007). Southern

California Bight 2003 Regional Monitoring Program: III. Benthic Macrofauna. Southern California Coastal Water Research Project. Costa Mesa, CA.

Southern California Coastal Water Research Project, Westminster, CA.

Schiff, K., K. Maruya, and K. Christenson. (2006). Southern California Bight 2003 Regional Monitoring Program: II. Sediment Chemistry.

Svejkovsky J. (2009). Satellite and Aerial Coastal Water Quality Monitoring in the San Diego/Tijuana Region: Annual Summary Report, 1 January, 2008–31 December, 2008. Ocean Imaging, Solana Beach, CA.